REMARKS

Favorable reconsideration is respectfully requested in view of the foregoing amendments and the following remarks.

I. CLAIM STATUS & AMENDMENTS

Claims 1-16 were pending in this application when last examined.

Claims 1-16 were examined on the merits and stand rejected.

Claims 1-16 are cancelled without prejudice or disclaimer thereto. Applicants reserve the right to file a continuation or divisional application on any cancelled subject matter.

Claims 17-24 are newly presented.

Support for claims 17, 20 and 23 can be found in the last paragraph on page 3 to the last full paragraph on page 4, the last paragraph on page 5 to the first full paragraph on page 6, the first full paragraph on page 7, the paragraph starting at the bottom of page 7 to the last full paragraph on page 9 and in <Embodiment 2> on page 11.

Support for new claim 18 can be found in claims 2-4 and in the first paragraph on page 4 of the specification as filed. Furthermore, support for the term "monolayer" can be found in the last paragraph on page 3 of the specification as filed.

Support for claims 19, 21, 22 and 24 can be found in claim 5 as filed. Furthermore, support for the term "monolayer" can be found as indicated above.

No new matter has been added

Claims 17-24 are pending upon entry of this amendment

II. INFORMATION DISCLOSURE STATEMENT

On page 2 of the Office Action, it is indicated that citations AJ, AK and AL of the IDS filed March 9, 2005 were not considered because a concise explanation of each of the references was not provided.

Applicants note that an International Search Report in the English language citing references AJ, AK and AL and indicating the relevance of each of the references was submitted with the IDS filed March 9, 2005. Such a disclosure is sufficient to comply with the requirements of 37 C.F.R. 1.98(a)(3). See MPEP § 609.04(a)(III), second paragraph. However, for the convenience of the Examiner, attached to this amendment are English language abstracts of references AJ, AK and AL.

Applicants respectfully request the Examiner to now consider these references.

III. INDEFINITENESS REJECTION

On pages 2-3 of the Office Action, claims 1-16 were rejected under 35 U.S.C. § 112, second paragraph, as indefinite for the terms "the hydrophobic chain", "ultrathin" and "a cumulative product".

It is respectfully submitted that the present amendment overcomes this rejection for reasons which are self-evident.

IV. PRIOR ART REJECTIONS

On pages 4-6 of the Office Action, claims 1-2, 5-6 and 11 were rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Chrisey et al. (Nucleic Acids Research, Vol. 24, No. 15, pp. 3040-3047, 1996).

On pages 6-7 of the Office Action, claims 1-6 and 8-13 were rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Koster et al. (US 2004/0209255).

On pages 8-9 of the Office Action, claims 1-16 were rejected under 35 U.S.C. § 103(a) as obvious over either Chrisey et al. or Koster et al. in view of Yeager et al. (US 4,659,624).

These rejections are respectfully traversed as applied to the new claims for the following reasons.

The subject matter of new claim 17 is an organic monolayer membrane comprising amphiphilic compounds each having a photoisomerization group as a chromophore and a nucleic acid base (A), and one or more oligonucleotides comprising a plurality of nucleic acid bases (B) capable of forming a base pair with the nucleic acid base (A) wherein there is interposed between each of the nucleic acid bases (B) at least one nucleic acid base that is not capable of forming a base pair with the nucleic acid base (A), wherein the nucleic acid bases (A) of the amphiphilic compounds form base pairs with the nucleic acid bases (B) of the one or more oligonucleotides, and wherein the amphiphilic compounds align to form the organic monolayer membrane.

As is stated in the "BEST MODE FOR CARRYING OUT THE INVENTION" and in Embodiments 1 and 2 of the specification, the essential feature of the invention is that a plurality of amphiphilic compounds each having a nucleic acid base (A) bind to an oligonucleotide by forming base pairs with the nucleic acid bases (B) in the oligonucleotides, which are interposed between one or more nucleic acid bases that do not bind the nucleic acid base (A). Accordingly, when the amphiphilic compounds bind to the oligonucleotide, a space is formed between each amphiphilic compound that corresponds to the length of the nucleic acids that do not bind the amphiphilic compounds interposed between each nucleic acid (B).

For example, a pair of amphiphilic molecules having a photoisomerization group and the nucleic acid base thymine can form "TA" base pairs with an oligonucleotide of sequence AGGA by binding A (adenine). The G (guanine) will not bind the thymine of the amphiphilic compound and thus generate a free space between each amphiphilic molecule.

Furthermore, if such complexes of amphiphilic compounds and an oligonucleotide are compressed, the free space around each of the amphiphilic compounds is maintained (See Fig. 1B). Therefore, the organic monolayer membrane of the invention can easily induce the trans-cis photoisomerization of the amphiphilic compounds.

On the other hand, if two or more nucleic acid bases (B) are adjacent to each other on the oligonucleotide, formation of free space in the organic monolayer membrane does not occur (See Fig. 1A) and photoisomerization of the amphiphilic compounds is inhibited.

For example, in Embodiment 1 of the specification, the use of oligonucleotides in which one or two guanines are interposed between each of the adenines capable of base pairing with the thymines of the amphiphilic compounds, enables inducement of photoisomerization of azobenzenes and inhibits formation of an aggregate of azobenzenes.

Although the combination of thymine-adenine base pairs as the nucleic acid bases (A) and (B) is exemplified as one embodiment of the invention, it is evident that the use of other pairs of nucleic acid base (A) and (B) could achieve the same result because the free space is formed by interposing another kind of nucleic acid base between each nucleic acid base (B).

The novel organic monolayer membrane of the invention enables photoisomerization of the chromophores into a high-density solid state, which is useful in a variety of technical fields such as optical memory.

On the other hand, Chrisey at al. teaches the preparation of a silane film derivatized with single stranded DNA which is subsequently hybridized with a fluorescently labeled complementary second strand of DNA (see page 3041, figure 7). The hybridization is performed in a buffer spread over the silane (see page 3042).

However, Chrisey et al. only teaches hybridization of single stranded DNA with a fluorescently labeled complementary second strand of DNA, and fails to teach a combination of amphiphilic compounds each having a photoisomerization group as a chromophore and a nucleic acid base (A), and one or more oligonucleotides comprising a plurality of nucleic acid bases (B) that form a base pair with the nucleic acid bases (A), wherein there is interposed between each of the nucleic acid bases (B) at least one nucleic acid base that is not capable of forming a base pair with the nucleic acid base (A). Moreover, Chrisey et al. fails to teach the nucleic acid bases (A) of a plurality of the amphiphilic compounds form base pairs with the acid base (B) in a

monolayer such that a space is formed between each of the amphiphilic compounds to enable photoisomerization of the chromophores. Therefore, Chrisey et al. does not teach or suggest all the elements of the claimed invention.

Koster et al. teaches gradient arrays on glass comprising a silane film (monolayer), and the use of proteins labeled with oligonucleotides and hybridization thereof on the film (see throughout the document and especially the abstract and figures 6-8), the use of azobenzene (Fig. 6), and hybridization in buffer spread over the gradient array (paragraphs [0110] and [0308]).

However, Koster et al. only teaches the use of proteins labeled with oligonucleotides and hybridization thereof on the film, and fails to teach a combination of amphiphilic compounds each having a photoisomerization group as a chromophore and a nucleic acid base (A), and one or more oligonucleotides comprising a plurality of nucleic acid bases (B) that form a base pair with the nucleic acid bases (A), wherein there is interposed between each of the nucleic acid bases (B) at least one nucleic acid base that is not capable of forming a base pair with the nucleic acid base (A). Therefore, Koster et al. does not teach or suggest the claimed invention.

Yeager et al. teaches compressing a laminate (see throughout the document and especially column 2, second paragraph).

However, even if the teachings of Yeager et al. are combined with those of Chrisey et al. or Koster et al. to obtain a compressed laminate, the combination still fails to teach a combination of amphiphilic compounds each having a photoisomerization group as a chromophore and a nucleic acid base (A), and one or more oligonucleotides comprising a plurality of nucleic acid bases (B) that form a base pair with the nucleic acid bases (A), wherein there is interposed between each of the nucleic acid bases (B) at least one nucleic acid base that is not capable of forming a base pair with the nucleic acid base (A). Therefore, the claimed invention will not be obvious for a person of ordinary skill in the art even if the cited references are combined.

As to other amended claims, claim 18 depends on claim 17. Claim 19 is a product obtained from the novel organic monolayer membrane of claim 17. Claims 20-21 are processes for producing the novel organic monolayer membrane of claim 17 and a product obtained from the novel organic monolayer membrane of claim 17. Claim 22 is a product obtained from the novel organic monolayer membrane of claim 18. Claims 23-24 are processes for producing the novel organic monolayer membrane of claim 18 and a product obtained from the novel organic monolayer membrane of claim 18. Accordingly, the invention of the present claims is neither taught nor suggested by the cited references either alone or in combination.

In view of the above, these rejections as applied to the new claims should be withdrawn.

CONCLUSION

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is in condition for allowance and early notice to that effect is hereby requested.

If the Examiner has any comments or proposals for expediting prosecution, please contact the undersigned attorney at the telephone number below.

Respectfully submitted,

Kuniharu IJIRO et al.

By: _____
Warren M. Cheek, Jr.
Registration No. 33,367
Attorney for Applicants

WMC/WRS/mjw
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
April 13, 2007

ATTACHMENTS:

1. English language Abstract of JP 08-6204
2. English language Abstract of JP 02-102254
3. English language Abstract of JP 02-102253

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 02-102254
(43)Date of publication of application : 13.04.1990

(51)Int.Cl. C08L 39/02
B05D 1/20

(21)Application number : 63-255592
(22)Date of filing : 11.10.1988

(71)Applicant : FUJIHIRA MASAMICHI
MITSUBISHI KASEI CORP
(72)Inventor : FUJIHIRA MASAMICHI

(54) LANGMUIR-BLODGETT FILM AND ITS PRODUCTION

(57)Abstract:
PURPOSE: To obtain a photosensitive, highly functional organic thin film which can reversibly undergo cis-trans photoisomerization by forming a polyion complex from a long-chain azobenzene derivative terminated with an anion and polyvinylamine.
CONSTITUTION: A photosensitive Langmuir-Blodgett film(LB film) is prepared by forming a polyion complex from a 20-50C long-chain azobenzene derivative terminated with an anion, such as 4-octyl-4'-(5-carboxypentamethyleneoxy) azobenzene, and polyvinylamine. This film can be prepared by casting a chloroform solution of the azobenzene as a film-forming substance on a solid substrate by using a dilute aqueous solution of polyvinylamine as an underlayer water and is used as a photochromic material of e.g., an ultrahigh density photomemory or a photoswitching device.

LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 02-102253
(43)Date of publication of application : 13.04.1990

(51)Int.Cl. C08L 39/00
B05D 1/20

(21)Application number : 63-255593
(22)Date of filing : 11.10.1988

(71)Applicant : FUJIHIRA MASAMICHI
MITSUBISHI KASEI CORP
(72)Inventor : FUJIHIRA MASAMICHI

(54) LANGMUIR-BLODGETT FILM AND ITS PRODUCTION

(57)Abstract:
PURPOSE: To obtain a photosensitive, highly functional organic thin film which can reversibly undergo cis-trans photoisomerization by forming a polyion complex from a long-chain azobenzene derivative terminated with an anionic group and a polydimethyldiallylammonium salt.

CONSTITUTION: A photoreactive Langmuir-Blodgett film(LB film) is prepared by forming a polyion complex from a 20-50C long-chain azobenzene derivative terminated with an ionic group, such as 4-octyl-4'-(5-carboxypentamethyleneoxy)- azobenzene, and a polydimethyldiallylammonium salt. This film can be obtained by casting a chloroform solution of the azobenzene derivative as a film-forming substance on a solid substrate on an underlayer water containing the polydimethyldiallylammonium salt. This film is useful as e.g., a photochromic material of an ultrahigh density photomemory or the like.

LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 08-006204
(43)Date of publication of application : 12.01.1996

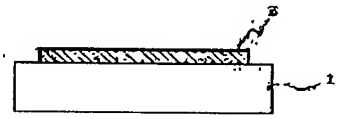
(51)Int.Cl. G03C 1/73
B41M 5/26
C07D335/02
C07D409/06
C09K 11/07
G11B 7/00
G11B 7/24
// C07D309/34

(21)Application number : 06-135691
(22)Date of filing : 17.06.1994

(71)Applicant : CANON INC
(72)Inventor : MIHARA CHIEKO
OKAMOTO HISASHI
YANO KEIYA
SANTO TAKESHI

(54) OPTICAL RECORDING MEDIUM, OPTICAL RECORDING METHOD AND INFORMATION REPRODUCING METHOD

(57)Abstract:
PURPOSE: To make it possible to reproduce information with high quality and to produce an optical recording medium at a low cost by having a recording layer contg. a nucleic acid and dyestuff which emits fluorescence by photoirradiation in co-presence of the nucleic acid on a substrate.
CONSTITUTION: The recording layer 2 contg. the nucleic acid and the dyestuff which emits the fluorescence by photoirradiation in co-presence of the nucleic acid is laminated on the substrate 1. The dyestuff described above is not particularly limited, insofar as the dyestuff emits fluorescence when subjected to the photoirradiation in co-presence of the nucleic acid. Such dyestuff includes, for example, cumarin dyestuff, such as rhodamine 6G and rhodamine B, as well as acridine dyestuff, pyrium dyestuff, etc. While the part not irradiated with light exhibits the high fluorescence, the part irradiated with the light hardly exhibits the fluorescence as the dyestuff is dissolved, when the recording layer 2 formed by contg. the nucleic acid and the dyestuff which emits the fluorescence by photoirradiation in co-presence of the nucleic acid is selectively irradiated with the light. The information is reproduced at high S/N by detecting the presence or absence of the fluorescence between both.



LEGAL STATUS

[Date of request for examination] 27.10.1999

[Date of sending the examiner's decision of

rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	3437256
[Date of registration]	06.06.2003
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	